UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,463	11/03/2003	Lavi Secundo	3078/1	3510

7590 12/13/2005

DR. MARK FRIEDMAN LTD.
C/o Bill Polkinghorn
Discovery Dispatch
9003 Florin Way
Upper Marlboro, MD 20772

EXAMINER	
POLYZOS, FAYE S	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 12/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/698,463	SECUNDO ET AL.
	Examiner	Art Unit
	Faye Polyzos	2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 30 September 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-47 and 49-56 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 29-38 is/are allowed.

6)☒ Claim(s) 1-7,9.11.14-21, 27-28, 39-42, 44-47,49-52 and 54-56 is/are rejected.

7)☒ Claim(s) 8,10,12,13,22-26,43 and 53 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 30 November 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7, 16-21, 39-42 and 49-52 are rejected under 35 U.S.C. 102(b) as being anticipated by *Beratan et al (US 6,245,591 B1).*

Regarding claim 1, Beratan discloses a thermal detection system comprising: a temperature sensing element (i.e. pyroelectric element) that includes an electro-optic (EO) material layer (i.e. ferroelectric material) and characterized by an index of refraction; an electrical mechanism for inducing a change in the index of refraction, the index change correlated with a temperature of the TSE; and an optical reading mechanism for reading the refraction index change, thereby providing a reading of the TSE temperature (col. 2, lines 13-24, lines 32-41 and lines 43-67).

Regarding claim 2, Beratan discloses the thermal detection system wherein the EO layer has a length axis, and wherein the optical reading mechanism includes a laser beam configured to propagate through the EO layer in a direction substantially along the length axis and a power meter for reading a change in the intensity of the laser beam after the beam exits the EO layer, the intensity change correlated with the refraction index change and the TSE temperature (col. 2, lines 13-24, lines 32-41 and lines 43-67).

Regarding claim 3, Beratan discloses the thermal detection system further comprising an absorbing layer attached to the EO layer, whereby radiation emitted by a remote body and absorbed in the absorbing layer determines the TSE temperature (col. 2, lines 33-42).

Regarding claim 4, Beratan discloses the thermal detection system wherein the radiation is infrared radiation (col. 1, lines 14-19).

Regarding claim 5, Beratan discloses a thermal link connecting the EO layer to a thermally conducting substrate that serves as a heat sink, and a temperature controller connected to the substrate and used for setting the substrate temperature (col. 5, lines 21-30).

Regarding claims 6 and 7, Beratan discloses the EO material is a ferroelectric material in a paraelectric phase (col. 2, lines 14-16).

Regarding claim 16, Beratan discloses a thermal detection system comprising: a temperature sensing element (TSE) that includes an electro-optic material layer having a length axis and characterized by an index of refraction; an electrical mechanism for inducing a change in the index of refraction, the index change corresponding to a temperature of the TSE; an optical reading mechanism that includes a laser beam propagating through the EO layer along the length axis and having a light intensity that changes as a result of the refraction index change; and a power meter for measuring the light change, whereby the detection light intensity change indicates the temperature of the TSE (col. 2, lines 13-24, lines 32-41 and lines 43-67).

Regarding claim 17, Beratan discloses the thermal detection system further comprising an absorbing layer attached to the EO layer, whereby radiation emitted by a remote body and absorbed in the absorbing layer determines the TSE temperature (col. 2, lines 33-42).

Regarding claim 18, Beratan discloses the thermal detection system wherein the radiation is infrared radiation (col. 1, lines 14-19).

Regarding claim 19, Beratan discloses a thermal link connecting the EO layer to a thermally conducting substrate that serves as a heat sink, and a temperature controller connected to the substrate and used for setting the substrate temperature (col. 5, lines 21-30).

Regarding claims 20 and 21, Beratan discloses the EO material is a ferroelectric material in a paraelectric phase (col. 2, lines 14-16).

Regarding claim 39, Beratan discloses a method for radiation sensing comprising the steps of: providing a temperature sensing element (i.e. pyroelectric element) that includes an electro-optic (EO) material layer (i.e. ferroelectric material) and characterized by an index of refraction; exposing the TSE to radiation, thereby affecting the temperature of the EO material; electrically inducing a change in the index of refraction, the change correlated with the TSE temperature; and optically reading the refraction index change, thereby providing a reading of the TSE temperature (col. 2, lines 13-24, lines 32-41 and lines 43-67).

Regarding claim 40, Beratan discloses the method wherein the radiation is infrared radiation (col. 1, lines 14-19).

Regarding claim 41, Beratan discloses wherein the EO layer has a length axis and wherein the step of optically reading includes propagating a beam through the EO layer in a direction substantially along the length axis, and reading an intensity of the beam after it exits the EO layer and the intensity correlated with the TSE temperature through the refractive index change (col. 2, lines 13-24, lines 32-41 and lines 43-67).

Regarding claim 42, Beratan discloses the method wherein the EO material is selected from the group consisting of a paraelectric and ferroelectric material (col. 2, lines 14-16).

Regarding claim 49, Beratan discloses a method for thermal imaging comprising the steps of: providing a plurality of temperature sensing elements (TSE), each the TSE having an electro-optic material layer and characterized by an index of refraction; providing at least one dummy, wherein the TSEs and the at least one dummy are located in respective adjacent columns; electrically inducing a change in the index of refraction of each of the TSE, the refraction index change correlated with the temperature of the TSE; and optically reading each TSE refraction index change, thereby providing a reading of each TSE temperature (See Abstract and col. 2, lines 13-24, lines 32-41 and lines 43-67).

Regarding claim 50, Beratan discloses the method wherein the TSEs and one dummy are arranged in an array of columns and rows, wherein the step of electrically inducing a change includes electrically applying an electric field to an entire row and wherein the step of optically reading includes optically reading one TSE and one dummy (See Abstract and col. 2, lines 13-24, lines 32-41 and lines 43-67).

Regarding claim 51, Beratan discloses the thermal detection system wherein the EO layer has a length axis, and wherein the optical reading mechanism includes a laser beam configured to propagate through the EO layer in a direction substantially along the length axis and a power meter for reading a change in the intensity of the laser beam after the beam exits the EO layer, the intensity change correlated with the refraction index change and the TSE temperature (col. 2, lines 13-24, lines 32-41 and lines 43-67).

Regarding claim 52, Beratan discloses the EO material is selected from the group consisting of a paraelectric material and a ferroelectric material (col. 2, lines 14-16).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 9, 11 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Beratan et al (US 6,245,591 B1)* as applied to claim 2 above, and further in view of *Jaeger et al (US 4,758,060)*.

Regarding claim 9, Beratan discloses a thermal detection system comprising: a temperature sensing element (i.e. pyroelectric element) that includes an electro-optic (EO) material layer (i.e. ferroelectric material) and characterized by an index of refraction; an electrical mechanism for inducing a change in the index of refraction, the

index change correlated with a temperature of the TSE; and an optical reading mechanism for reading the refraction index change, thereby providing a reading of the TSE temperature (col. 2, lines 13-24, lines 32-41 and lines 43-67). Beratan does not disclose of a Mach Zehnder Interferometer (MZI) reading configuration. Jaeger discloses a thermal detection system wherein parallel dummy immune to radiation induced temperature changes positioned in parallel with TSE wherein optical reading mechanism further includes a Mach Zehnder Interferometer (MZI) reading configuration (col. 1, lines 51-68 and col. 2, lines 1-15). Jaeger teaches electro-optic high voltage sensors comprise a Mach-Zehnder device of the diffusion type having first and second parallel waveguide sections for transmission of an input signal, wherein first and second wavelength guide sections are covered with thin films of material having large refractive indices to the waveguide sections, the thin films having sufficiently different thickness above each of the parallel waveguide sections so that a uniform elector-magnetic field applied to the parallel waveguide section will cause propagation constant in the parallel waveguide sections to be varied in different ways, resulting in a phase difference between signal transmitted by the first and second waveguide sections (claim 4). Therefore, it would have been obvious to modify the apparatus suggested by Beratan, to include a Mach Zehnder Interferometer (MZI), as disclosed supra by Jaeger, to allow for a more versatile apparatus.

Regarding claim 11, Jaeger discloses the MZI reading configuration includes a splitter for splitting the laser beam into two beams to obtain a combined output light

intensity measurement based on the two beams and correlated with TSE temperature through the index of refraction change (col. 3, lines 1-12).

Regarding claims 14 and 15, Jaeger discloses an optical calibrating mechanism used for calibrating the light intensity (col. 1, lines 52-61).

5. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Beratan et al (US 6,245,591 B1)* as applied to claim 16 above, and further in view of *Jaeger et al (US 4,758,060).*

Regarding claim 27, Beratan discloses a thermal detection system comprising: a temperature sensing element (TSE) that includes an electro-optic material layer having a length axis and characterized by an index of refraction; an electrical mechanism for inducing a change in the index of refraction, the index change corresponding to a temperature of the TSE; an optical reading mechanism that includes a laser beam propagating through the EO layer along the length axis and having a light intensity that changes as a result of the refraction index change; and a power meter for measuring the light change, whereby the detection light intensity change indicates the temperature of the TSE (col. 2, lines 13-24, lines 32-41 and lines 43-67). Beratan does not disclose of a calibration mechanism. Jaeger discloses an optical calibrating mechanism used for calibrating the light intensity (col. 1, lines 52-61). Jaeger teaches a Mach-Zehnder type interferometer to act as a high voltage sensor, the device is adapted so that the propagation constants of the two parallel sections of the device are different functions of the applied electric field or potential, as a result the relative phases of the guided optical fields emanating from each of the parallel sections is different, and the phase difference

is measured as a change in the output intensity in the output section of the device (col. 1, lines 52-61). Therefore, it would have been obvious to modify the apparatus suggested by Beratan to include a calibration mechanisms, as disclosed by Jaeger, to allow for a more versatile apparatus.

Regarding claim 28, Jaeger discloses the calibrating mechanism is selected from the group consisting of phase compensator (col. 1, lines 52-61).

6. Claims 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Beratan et al (US 6,245,591 B1)* as applied to claim 41 above, and further in view of *Jaeger et al (US 4,758,060).*

Regarding claim 44, Beratan discloses a thermal detection system comprising: a temperature sensing element (i.e. pyroelectric element) that includes an electro-optic (EO) material layer (i.e. ferroelectric material) and characterized by an index of refraction; an electrical mechanism for inducing a change in the index of refraction, the index change correlated with a temperature of the TSE; and an optical reading mechanism for reading the refraction index change, thereby providing a reading of the TSE temperature (col. 2, lines 13-24, lines 32-41 and lines 43-67). Beratan does not disclose of a Mach Zehnder Interferometer (MZI) reading configuration. Jaeger discloses a thermal detection system wherein parallel dummy immune to radiation induced temperature changes positioned in parallel with TSE wherein optical reading mechanism further includes a Mach Zehnder Interferometer (MZI) reading configuration (col. 1, lines 51-68 and col. 2, lines 1-15). Jaeger teaches electro-optic high voltage sensors comprise a Mach-Zehnder device of the diffusion type having first and second

parallel waveguide sections for transmission of an input signal, wherein first and second wavelength guide sections are covered with thin films of material having large refractive indices to the waveguide sections, the thin films having sufficiently different thickness above each of the parallel waveguide sections so that a uniform elector-magnetic field applied to the parallel waveguide section will cause propagation constant in the parallel waveguide sections to be varied in different ways, resulting in a phase difference between signal transmitted by the first and second waveguide sections (claim 4). Therefore, it would have been obvious to modify the apparatus suggested by Beratan, to include a Mach Zehnder Interferometer (MZI), as disclosed supra by Jaeger, to allow for a more versatile apparatus.

Regarding claim 45, Jaeger discloses the method wherein the step of optically reading further includes positioning a parallel dummy immune to radiation induced temperature changes in parallel with TSE, and wherein the optical reading mechanism includes a first beam propagating through the TSE and a second beam propagating through the parallel dummy, and means to obtain output light intensity measurements based on two beams and correlated with TSE temperature through index of refraction change (col. 3, lines 1-12).

Regarding claims 46-47, Jaeger discloses the method further comprising the step of calibrating the light intensity by positioning an optional calibrating mechanism (col. 1, lines 52-61).

7. Claims 54-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Beratan et al (US 6,245,591 B1)* as applied to claim 51 above, and further in view of *Jaeger et al (US 4,758,060).*

Regarding claim 54, Beratan discloses the method wherein the step of electrically inducing a change in the index of refraction includes applying the electrical field to a pair composed of the TSE and at least one dummy (col. 2, lines 13-24, lines 32-41 and lines 43-67). Beratan does not disclose of a Mach Zehnder Interferometer reading configuration. Jaeger discloses the step optically reading further includes reading the intensity through a Mach Zehnder Interferometer (MZI) reading configuration (col. 1, lines 51-68 and col. 2, lines 1-15). Jaeger teaches electro-optic high voltage sensors comprise a Mach-Zehnder device of the diffusion type having first and second parallel waveguide sections for transmission of an input signal, wherein first and second wavelength guide sections are covered with thin films of material having large refractive indices to the waveguide sections, the thin films having sufficiently different thickness above each of the parallel waveguide sections so that a uniform elector-magnetic field applied to the parallel waveguide section will cause propagation constant in the parallel waveguide sections to be varied in different ways, resulting in a phase difference between signal transmitted by the first and second waveguide sections (claim 4). Therefore, it would have been obvious to modify the apparatus suggested by Beratan, to include a Mach Zehnder Interferometer (MZI), as disclosed supra by Jaeger, to allow for a more versatile apparatus.

Regarding claims 55 and 56, Jaeger discloses the reading through the MZI reading configuration includes splitting the laser beam into two beams that propagate respectively through the TSE and the dummy of the pair and combining the two beams into an exit beam after they exit the TSE and the dummy, the reading intensity including reading an intensity of the exit beam (col. 1, lines 51-68 and col. 2, lines 1-15).

Allowable Subject Matter

8. Claims 29-38 are allowed.

9. The following is a statement of reasons for the indication of allowable subject matter:

Regarding independent claim 29, the prior art does not disclose or fairly suggest a thermal detection system comprising a plurality of dummies, wherein the electrical mechanism is applied to a pair of the individual (TSE) where the optical reading mechanism applied simultaneously to the (TSE) and the dummy of the pair to provide a reading of a temperature difference between (TSE) and dummy. The examiner notes that while it is known in the art of a thermal detection system comprising: a temperature sensing element (i.e. pyroelectric element) that includes an electro-optic (EO) material layer (i.e. ferroelectric material) and characterized by an index of refraction; an electrical mechanism for inducing a change in the index of refraction, the index change correlated with a temperature of the TSE; and an optical reading mechanism for reading the refraction index change, thereby providing a reading of the TSE temperature (see for example Beratan et al -- US 6,245,591 B1 -- col. 2, lines 13-24, lines 32-41 and lines 43-67), the prior art does not suggest a plurality of temperature sensing elements and a

plurality of dummies, wherein electrical mechanism is applied to a pair composed of a TSE and a dummy thereby providing a reading of temperature difference between the TSE and the dummy.

The remaining claims 30-38 are allowable on the basis of their dependency.

10. Claims 8, 10, 12-13, 22-26, 43 and 53 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding dependent claims 8 and 10, the prior art, as stated supra, does not disclose or fairly suggest of a thermal detection system wherein the optical reading mechanism includes a cross-polarizers configuration of two polarizers positioned on two sides of the TSE along the length axis.

Regarding dependent claims 12 and 13, the prior art, as stated supra, does not disclose or fairly suggest of a thermal detection system wherein the parallel dummy includes an EO material different from the TSE EO material.

Regarding dependent claims 22-24, the prior art, as stated supra, does not disclose or fairly suggest of a thermal detection system wherein the optical reading mechanism includes a cross-polarizers configuration of two polarizers positioned on two sides of the TSE along the length axis.

Regarding dependent claims 25 and 26, the prior art, as stated supra, does not disclose or fairly suggest of a thermal detection system wherein the parallel dummy includes an EO material different from the TSE EO material.

Regarding dependent claim 43, the prior art, as stated supra, does not disclose or fairly suggest of a method wherein the step of optically reading further includes positioning two cross-polarizers on two sides of TSE to obtain intensity reading.

Regarding dependent claim 53, the prior art, as stated supra, does not disclose or fairly suggest of a method wherein the step of optically reading further includes positioning two cross-polarizers on two sides of TSE to obtain intensity reading.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Polyzos whose telephone number is 571-272-2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FP

OTILIA GABOR
PRIMARY EXAMINER